

## CUMACEA FROM A SOUTH AUSTRALIAN REEF

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Fig. 1-23.

ON the eastern side of Gulf St. Vincent and south of Adelaide is a series of flat reefs formed of Miocene limestone; they are largely exposed at low tide and, towards the outer edge, covered by at least a fathom of water at high tide.

The following notes concern a reef half a mile in length and situated at Sellick's Beach, 30 miles south of Adelaide.

Parts of the outer areas of this reef are covered with flat, loose stones, detritus from the hard Cambrian and Precambrian rocks and the Miocene bed-rock. The latter in particular are clothed on the upper faces with a short filamentous alga, and this, aided by the natural roughness of the soft stone, loosely holds a film of sand several millimetres in thickness, and much more where it fills cracks and crevices. Investigation showed that the sand lodged on these stones provides a footing for a surprising number of burrowing Crustacea, including Cumacea.

These littoral sand-dwellers were collected by lifting stones off the bottom, carefully bringing them to the surface so that the sand film was disturbed as little as possible, and immersing them in a large bucket of about 1% formalin (commercial formalin 1 part, sea water 40 parts); after a period the rocks were well rinsed in the solution and removed. The resultant debris was then poured into a strainer of 2 mm. mesh to separate the coarsest material, which was bottled in alcohol separately; finally the smaller detritus was washed in a cloth sieve, which removed most of the sand but retained the small crustaceans, etc.

It was found necessary to leave the stones in the formalin for a period of at least fifteen minutes; Amphipoda, in particular, leave their retreats at once, but some other forms are more resistant. Immediate "grading" of the debris was found to be advantageous, as the more delicate Crustacea thus survive damage.

Sandy patches on the reef, and the adjacent beach between tide marks, were also investigated. As regards Cumacea, collecting over a few square yards of the reef by the methods outlined above produced the following results:

(1) At least fifteen species, belonging to eleven genera, live in the shifting coating of sand on the stones of the reef. Two of these also occur in sandy patches on the reef and in the adjacent beach, where a form (*Gephyrocuma palu* gen. et. sp. nov.), not so far taken on stones, is found as well.

(2) All but four of the species from the reef have not been recorded from Australia previously.

(3) Although no tow-netting was carried out, males are represented in all but three of the species taken, and in only one of these three were more than two specimens secured.

Our knowledge of Australian Cumacea is regrettably fragmentary. Including the forms described in this paper, forty-six species are definitely named and recorded. Of these, twenty-five are now known to occur in South Australia (Hale, 1928, pp. 31-47, 1929, 1932, and 1936); only one has been taken in Victoria (Sars, 1887, p. 12); fourteen were found off Western Australia (Zimmer, 1914—two unidentified species also mentioned—and 1921; Hale, 1927, p. 47), and eight have been listed from Queensland waters (Sars, 1887, pp. 19 and 20; Foxon, 1932—who mentions that apparently three other species are also represented in the material which he examined). During a recent brief visit to Tasmania Mr. N. B. Tindale, at the writer's request, was good enough to pass some sand-filmed stones from a reef through weak formatin as described above, and four species were found amongst the debris so secured (pp. 417, 418, 424 and 437).

#### FAMILY BODOTRIIDAE.

##### CYCLASPIS G. O. Sars.

##### CYCLASPIS PURA sp. nov.

Ovigerous female. Integument firm, but delicate and easily broken; finely reticulate and sparsely pitted. Carapace with dorsal edge slightly arched, slightly less than one-third total length of animal, its depth more than half its length, and equal to the greatest breadth. Pseudorostral lobes barely reaching apex of the ocular lobe. Ocular lenses black. Antennal notch moderate and tooth subacute, rounded. Sides of carapace devoid of ridges or sculpture, but dorsum with a distinct median carina.

Greater part of first pedigerous somite concealed and second large, with a dorsal carina. Third and fourth somites slightly elevated dorsally, and dorsal margins in lateral view slightly concave; dorsum of third with postero-lateral angles tumid.

First five pleon somites with well-developed lateral articular processes and with barely discernible infero-lateral carinae, but no other sculpture; first to fourth and telsonic somites all of approximately equal length.

First antennae with second and third segments of peduncle subequal in length, and together shorter than the stout basal segment; inner flagellum represented by

a minute vestige and the outer three-jointed, the first segment twice as long as the other two together. Maudibles with ten to twelve spines on inner edge.

Basis of second maxillipeds nearly one-third as long again as remaining segments together, and with a long, plumose, apical seta on inner edge. Basis of third

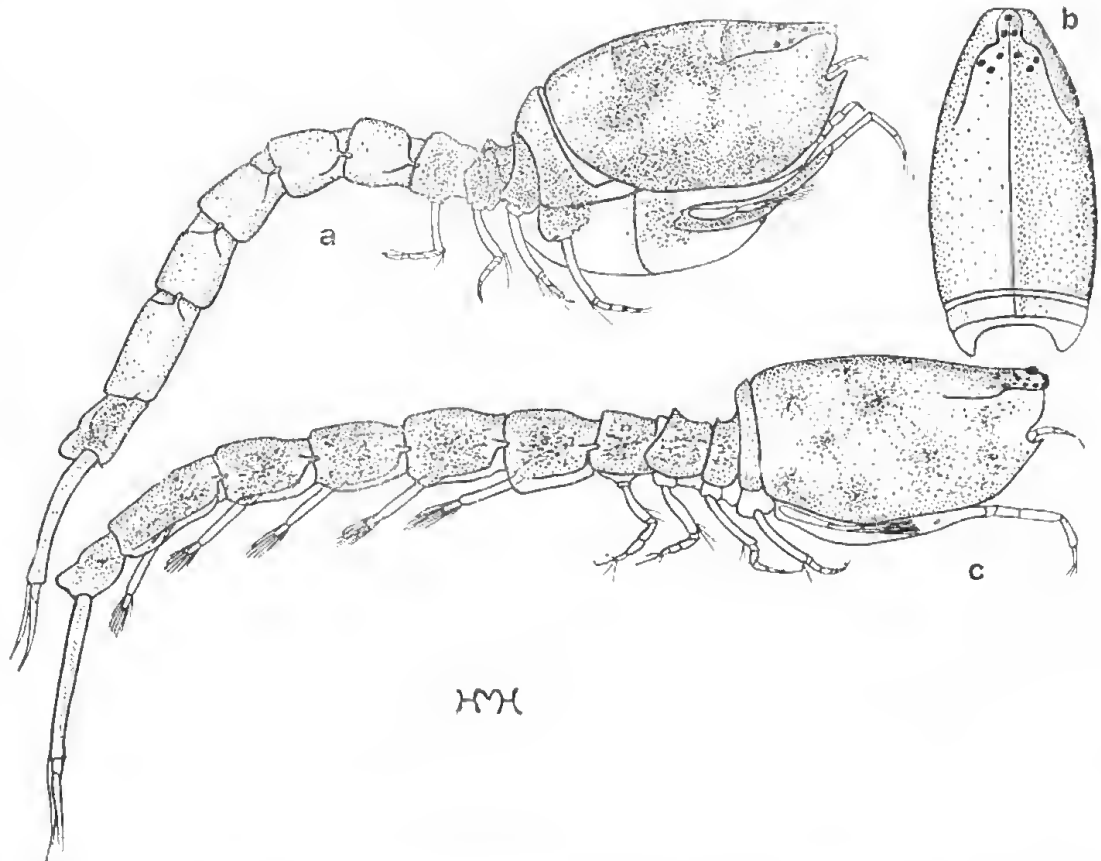


Fig. 1. *Cycloaspis pura*, type female; a, lateral view; b, dorsal view of carapace. c, Lateral view of allotype male (all  $\times 23$ ).

maxillipeds twice as long as rest of limb, bent outwards at middle of length, and with outer apical portion widened and extending forwards to level of insertion of carpus; ischium subcylindrical, and outer part of merus greatly produced, extending to external apical angle of the carpus. First pereopod about as long as carapace, with carpus reaching slightly beyond level of antennal angle; basis distinctly longer than other segments together, narrowed distally and with inner apical angle somewhat produced, but not reaching apex of ischium; carpus as long as ischium and merus together, and longer than either propodus or dactylus, which are subequal in length. Basis of second legs not quite as long as remaining segments

together; ischium short, merns longer than carpus, which is longer than propodus; dactylus as long as merns.

Peduncle of uropods slender, nearly twice as long as telsonic somite, and one-fourth as long again as fifth pleon somite; exopod a little longer than endopod, and less than two-thirds as long as peduncle; endopod with two spines on inner margin.

Colour white, with dark brown mottlings and stellate markings.

Length 4.7 mm.

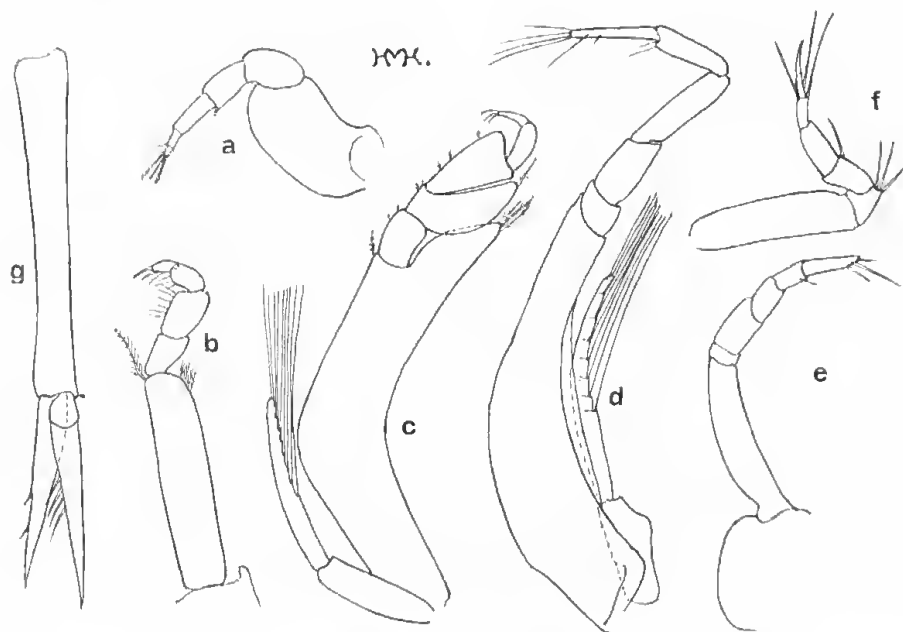


Fig. 2. *Cyclopsis pura*, ovigerous female; a, first antenna ( $\times 110$ ); b and c, second and third maxillipeds ( $\times 70$ ); d, e, and f, first, second, and fourth pereopods ( $\times 70$ ); g, uropod ( $\times 60$ ).

Adult male. Differs from the female in having the carapace relatively a little shorter, the ocular lenses larger, and the antennal notch somewhat wider, the first pedigerous somite wholly concealed, the second pedigerous somite shorter, and the uropods proportionately longer. The pleural parts of the third to fifth pedigerous somites are more expanded. The infero-lateral carinae of the pleon are much more distinct, overhanging the flagellum of the second antenna, which reaches back to beyond the middle of length of peduncle of uropod.

Length 4.7 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Beach, burrowing in sand at edge of sea (H. M. Hale, Mar., 1936), and Sellick's Reef, on stones, 1 fath. (H. M. Hale, Mar. and Apl., 1936); Yorke Peninsula, Cable Bay, on stones (H. Womersley, Apl., 1936). Types in South Australian Museum, Reg. No. C. 1995-1996.

In immature specimens the uropods are relatively shorter. Thus, in an ex-

ample 3.2 mm. in length the peduncle is only as long as the fifth pleon somite, and the exopod is nearly as long as the peduncle, while in a specimen 2.3 mm. in length the exopod slightly exceeds the peduncle in length.

This species was burrowing in white sand with which tiny fragments of dead leaves of *Cymodocea*, dark brown in colour, were sparsely admixed. The colouration of the animals closely simulated their surroundings, all being milk-white and varyingly marked with dark brown. A few examples have the colour pattern marked out by widely-spaced dots.

*C. pura* belongs to the group of species in which the pseudorostral lobes do not meet in front of the eyelobe, and in which the carapace is not sculptured—excepting for the dorsal carina which is often present. It resembles *C. tenuis* Thomson which has been recorded from Queensland by Poxon (1932, p. 390), but the basis of the first leg lacks a long apical seta, the uropods of the adult are much longer, there are no dorsal and lateral keels on the pleon, and there is no trace of a feeble keel running back from the antennal notch. In *C. pusilla* Sars (1887, p. 19, pl. i, fig. 21-23) the carapace is "almost globular", with the dorsum more arched; there is a slight median dorsal keel on the pleon somites, and the uropods are relatively shorter in the adult.

*Cyelaspis formosae* Zimmer (1921a, p. 124, fig. 15-18) is also rather like *C. pura*, but the carapace of that species apparently lacks a dorsal carina, the basis of the first pereopods is shorter than the rest of the limb, and has an apical spine reaching to the end of the ischium, while the basis of the second pereopods is a little longer than the remainder of the leg; further the uropoda are of different proportions, although it may be noted that Zimmer's specimens are immature.

#### LEPTOCUMA G. O. Sars.

An undescribed species from Sellick's Reef is apparently referable to *Leptocuma*.

Apart from the genotype, *L. kinbergii* Sars (1873, p. 24, pl. vi, fig. 29-33), two other species, *L. minor* Calman (1912, p. 616, fig. 14-20) and *L. pulcinci* Hale (1928, p. 38, fig. 7-8), have been referred to the genus, while a fifth *Vaunthompsonia* (?) *australiac* Zimmer (1921, p. 4, fig. 1-7), is linked to this little assemblage of species by certain of its characters.

*Leptocuma kinbergii* is known only from the female, *L. minor* from the adult male and female, *L. pulcinci* from the immature male and ovigerous female, *L. sheardi* sp. nov. from the female, and *Vaunthompsonia* (?) *australiac* from a juvenile male. In view of the insufficiency of our knowledge regarding these five species, and in order to avoid subsequent confusion, it seems desirable temporarily to refer them all to *Leptocuma*. They may be separated thus:

- a. Eye not pigmented. Pseudorostral lobes not or scarcely produced in front of ocular lobe. Uropoda with exopod shorter than endopod . . . . . *kinbergii*
- aa. Eye pigmented. Pseudorostral lobes a little produced in front of ocular lobe. Uropoda with exopod as long as or longer than endopod.
  - b. Proximal segment of endopod of uropoda shorter than second . . . . . *pulteneci*
  - bb. Proximal segment of endopod of uropoda much longer than second.
    - c. Carpus of second peraeopods barely more than half as long as merus. Proximal joint of endopod of uropoda four to five times as long as second . . . . . *australiac*
    - cc. Carpus of second peraeopods longer than merus. Proximal joint of endopod of uropoda twice as long as second.
      - d. Carapace without median dorsal carina. First peraeopods with basis a little longer than rest of limb, and with a tuft of long hairs on propodus. Carpus of second peraeopods not much longer than merus (as long as ischium and merus together) . . . . . *minor*
      - dd. Carapace with a median dorsal carina. First peraeopods with basis shorter than rest of limb, and without tuft of long hairs on propodus. Carpus of second peraeopods more than one and one-half times as long as merus (distinctly longer than ischium and merus together) . . . . . *sheardi*

*L. sheardi* is the only one of the above species lacking a subapical tuft of hairs on the propodus of the first peraeopods. *L. australiac* alone has a large spoon-shaped apical process on the basis of the first legs, and, according to Zimmer, also has very unusual third maxillipeds. These two forms differ from the others in having the five terminal joints of the first peraeopods together longer than the basis.

The carapace has a median dorsal carina in *L. pulteneci*, *L. australiac*, and *L. sheardi*.

The male of *L. australiac* and *L. pulteneci* possesses five pairs of pleopods, but in *L. minor* only three pairs are present in that sex.

Exopods are well developed on the first four pairs of peraeopods of the adult male of *L. minor*, but in the immature male of both *L. australiac* and *L. sheardi* that of the fourth leg is rudimentary. Zimmer suggests that this incomplete development of the last exopod may be a character of the juvenile male.

#### LEPTOCUMA SHEARDI sp. nov.

Female. Body slender, a little compressed. Carapace nearly one-fourth of total length, its vertical height equal to two-thirds its length; the lateral areas are marked with radiating striae, and the dorsum has a median longitudinal ridge. Pseudorostral lobes short and rounded, produced (but not in contact) in front of

ocular lobe for a distance equal to one-half of length of last-named. Ocular lobe wide and pigmented. Antennal notch very wide and shallow, and antennal angle rounded.

First pedigerous somite concealed excepting for a small dorsal section; second with pleural parts overlapping first somite and carapace; third overlapping second and fourth somites infero-laterally; pleural portions of fourth and fifth somites a little produced backwards.

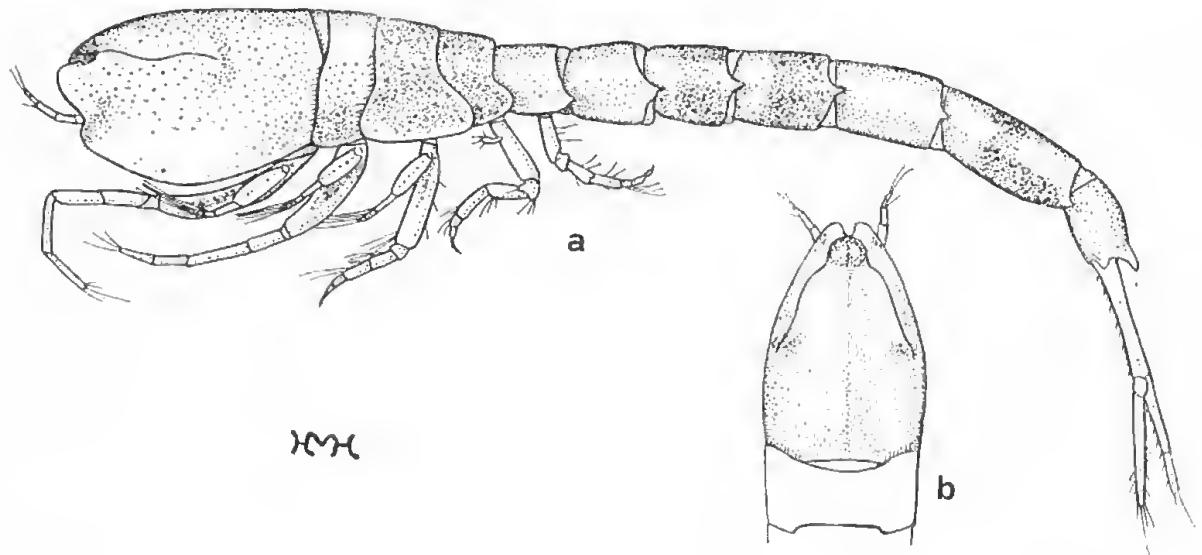


Fig. 3. *Leptocuma sheardi*, type female; a, lateral view; b, dorsal view of carapace ( $\times 20$ ).

First to fifth pleon somites successively increasing in size, the fifth being twice as long as the first; telsonic somite two-thirds as long as preceding somite.

First antennae with the two terminal joints of peduncle subequal in length, with the flagellum two-jointed and the accessory flagellum single-jointed.

Third maxillipeds with palp three-fifths as long as basis, which is wide and produced laterally (but not forwards) at distal end. First pereopods with basis not nearly reaching to level of antennal notch, shorter than remaining joints together, and with plumose hairs and a long subapical spine on inferior margin; the merus is distally produced on the outer margin, is subequal in length to the carpus, a little shorter than the propodus, and barely longer than the dactylus. Second pereopods with basis five-sevenths as long as remainder of limb; ischium distinct; carpus more than half as long again as merus, which is slightly longer than either propodus or dactylus. Basis of third pereopods about as long as rest of limb, that of fourth and fifth pairs much shorter. First three pairs of pereopods with a well-developed exopod; fourth pair with rudimentary exopod, which is two-jointed, the second segment minute.

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A juvenile 2.75 mm. in length has the fifth peracopods as yet undeveloped; nevertheless, the exopods of the first to fourth pairs are as in the adult female described above, and are similarly furnished with setae, long in the case of all but the rudimentary pair. It would seem that the period at which long setae appear on the exopods varies in different species. In some subadult Nannastacids they are not developed, and in a relatively large male of *Dic lasiodactylum* (described elsewhere in this paper) they are very short.

*L. sheardi* apparently resembles *L. minor* Calman rather than the other two Australian species, *L. pulleinci* Hale (South Australia) and *L. australiae* Zimmer (Western Australia); from both of these it may be separated at a glance by the proportions of the first and second peracopods and uropods.

#### GEPHYROCUMA gen. nov.

Pseudorostral lobes contiguous in front of ocular lobe. Eye present. First antennae with three-jointed peduncle and with accessory flagellum rudimentary. Second antennae of male (submature) with flagellum composed of short joints. Mandible with long spine row. Branchial leaflets few. Third maxillipeds with well-developed exopod in both sexes and with apex of basis greatly expanded and apically produced on inner side. Peracopods similar in both sexes: first pair massive, with ischium and carpus expanded; first and second pairs with well developed exopods; third pair with small, two-jointed exopod without long setae, and fourth with a rudimentary, single-jointed exopod. Male with five pairs of pleopods.

Pleural parts of second to fourth pedigerous somites backwardly produced, expanded and generously overlapping bases of peracopods. Fifth pleon somite not distinctly longer than any of the others, and telsonic segment produced between bases of uropods.

Genotype: *Gephyrocuma pala* sp. nov.

Outstanding features of the genus are furnished by the character of the maxillipeds and first peracopods.

#### GEPHYROCUMA PALA sp. nov.

Subadult female. Integument moderately firm. Carapace deeper than wide, equal in length to the pedigerous somites together, and longer than pleon; with an obsolete, longitudinal dorsal carina, otherwise without sculpture. Pseudorostral lobes meeting for a short distance, each apically truncate in dorsal view. Ocular lobe wide, subtriangular, and eyes pigmented. Antennal notch small.

Only a short dorso-lateral section of first pedigerous somite exposed: inferior margin of backwardly produced pleural portion of second twice as long as dorsal

length of the somite, and third with dorsal length very short; fourth somite twice as long as that of first to third together, and with pleural portion truncate; fifth small, only about as large as pleon somites, which are subequal in length.

First antennae with peduncle stout, the third joint longer than second, and the first longer than the other two together; flagellum two-jointed and accessory flagellum rounded, single-jointed, minute.

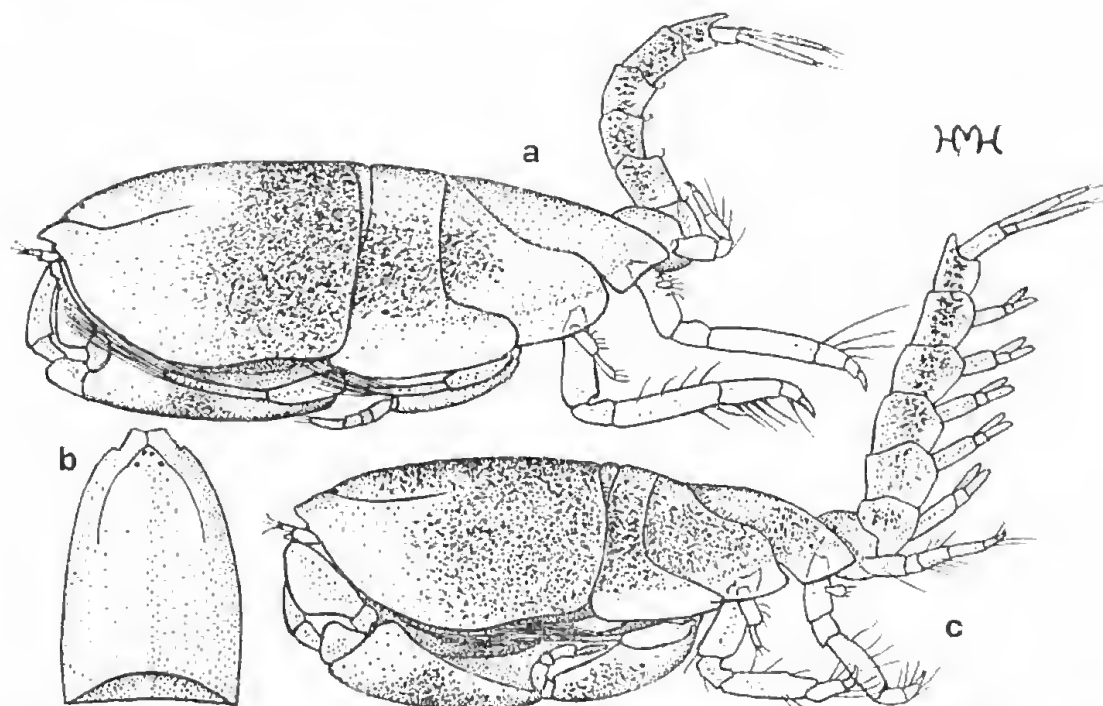


Fig. 5. *Gephyrocuma pala*, type female; a, lateral view; b, dorsal view of carapace. c, Lateral view of allotype male (all  $\times 40$ ).

Basis of third maxillipeds massive, and with the distal lobe very wide, apically subtruncate, and reaching to level of apex of propodus; outer apical angle with a pair of plumose setae, and inner margin with three hooked plumose setae; palp only one-third as long as basis, with dactylus stout. First peracopods with carpus reaching to end of pseudorostrum; basis very stout, curved, scarcely longer than rest of limb; ischium with inner part greatly expanded and produced to beyond level of articulation of carpus; merus short and carpus subtriangular in shape owing to the lamellate inner edge; propodus widest distally, longer than carpus, and twice as long as ischium and merus together; dactylus only half as long as carpus. Second peracopods with basis stout, one-third as long again as the remaining segments together; ischium and carpus short, merus and propodus subequal in length, each shorter than dactylus. Third and fourth legs each with merus elon-

gate and as long as the basis; ischium and carpus approximately equal in length. Fifth legs shorter, with meris and carpus elongate, subequal in length.

Peduncle of uropods somewhat shorter than telsonic somite, and half as long as the rami, which are subequal in length and practically unarmed; endopod two-jointed, the second segment nearly two-thirds as long as the first.

Ground colour of first and second peraeopods, and of anterior portion of carapace, yellow, of remainder of animal white. Cephalothorax, bases of first two pairs of legs and pleon boldly splashed with dark brown, and with dendritic markings.

Length 2.5 mm.

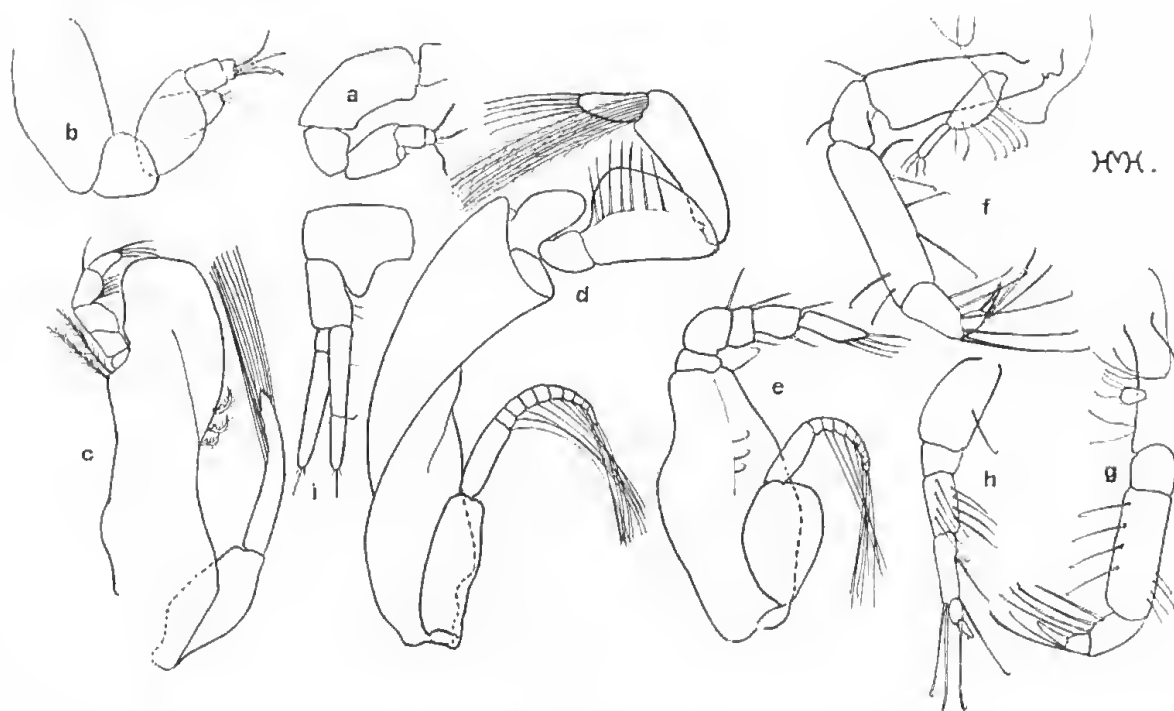


Fig. 6. *Gephyroecuma pala*. a, First antenna of paratype female. Paratype male; b, first antenna; c, third maxilliped; d to h, first to fifth peraeopods; i, telsonic somite and uropod (a and b,  $\times 92$ ; c to i,  $\times 58$ ).

Submature male. Differs from the female in the following characters. The carapace is not so deep, and the whole cephalothorax is more lightly built. The pleon is relatively larger, slightly longer than the carapace instead of a little shorter, and the infero-lateral margins of the first to fifth somites are expanded to overhang the bases of the peduncles of the pleopods. The first antennae are stouter and larger, and the lash of the second pair reaches nearly to the hinder margin of the second pedigerous somite, and is composed of numerous short joints. The first and second legs are relatively more massive.

Length 2.4 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Beach, burrowing in sand at margin of sea (H. M. Hale, Mar., Apl. and Sept., 1936), and Sellick's Reef, on sandy patch (H. M. Hale, Mar., 1936). Types in South Australian Museum, Reg. No. C. 2000, 2001.

As with *Cyclaspis pata*, *Picrocuma poccilota*, and *Leptocuma sheardi*, the coloration accords with that of the sand intermixed with dark brown fragments of *Cymodocea*.

With the legs folded, this interesting species has the form of a blunt-nosed bullet. The basis of the first legs is twisted in the beginnings of a spiral, so that the inner face fits snugly against the sides of the carapace and the preceding appendages, while the palp-like, five terminal joints of the second leg are folded back, as shown in the sketch of the male.

The first legs of Zimmer's *Faunthomsonia* (?) *australiae* (above referred tentatively to *Leptocuma*), from North-western Australia, are similar to those of *Gephyrocuma*, but are less markedly expanded.

*G. pata* is the only one of the species herein recorded which was not taken on the reef, but only on the adjacent beaches. It occurs at the water's edge along the whole of the bay, three miles in length, between Sellick's Reef and Port Willunga.

#### PICROCUMA gen. nov.

Pseudorostral lobes contiguous in front of the wide ocular lobe. Eye present. First antennae with three-jointed peduncle and with rudimentary accessory flagellum. Mandible with spine-row short, including only four and five spines; lacinia spiniform and molar process stout; incisor portion greatly elongated, with cutting edge tridentate. Third maxillipeds furnished with exopod and not markedly differing from first peracopods; basis not produced apically. First peracopods short, and second to fourth subequal in length; first to third pairs with well-developed exopods in the female. Uropoda with endopod single-jointed. Second pedigerous segment much longer than the others in the ovigerous female. Adult male unknown.

Genotype: *Picrocuma poccilota* sp. nov.

The salient features of the genus are found in the structure of the mandibles and the unspecialized third maxillipeds.

#### PICROCUMA POECHLOTA sp. nov.

Ovigerous female. Integument not highly indurated. Carapace as wide as depth, which is little less than the length; surface smooth. Pseudorostral lobes meeting in front of ocular lobe for a distance greater than length of last-named;

apically bluntly rounded in dorsal view. Ocular lobe twice as wide as long; eye darkly pigmented. Antennal notch very wide and shallow; antennal angle obtusely rounded.

All five pedigerous somites exposed; second almost as long as third to fifth together, and with pleural parts little expanded, but overlapping first and third somites.

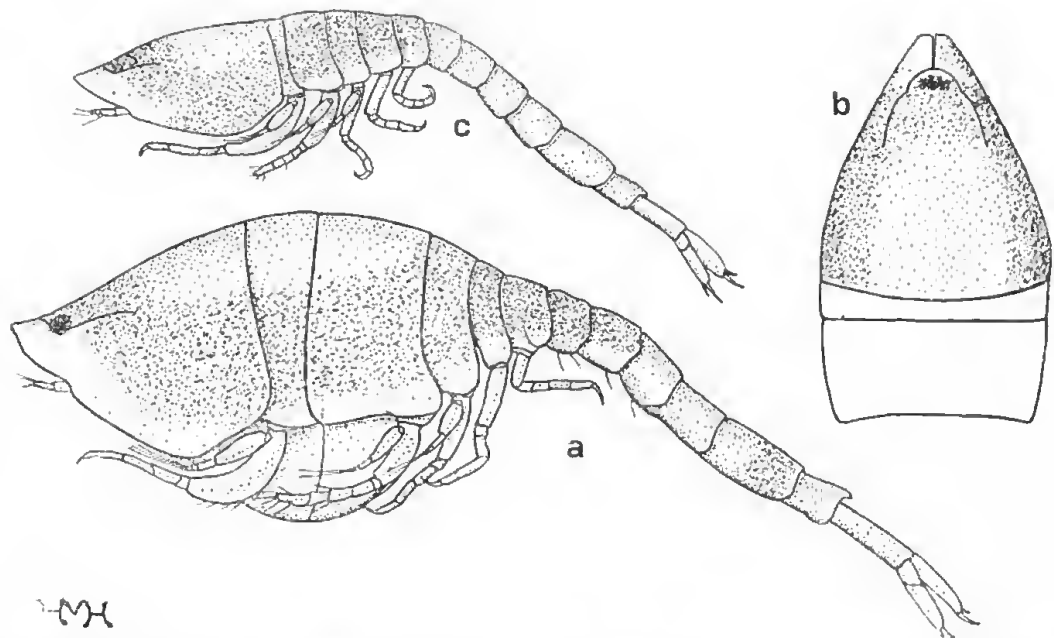


Fig. 7. *Pieroruma poccilata*, type female; a, lateral view; b, dorsal view of carapace, c, lateral view of juvenile (all  $\times 50$ ).

Pleon with first to third somites successively increasing in length; fourth as long as third, and fifth much longer; telsonic somite about as long as third, scarcely produced between bases of uropods.

First antennae with first joint of peduncle very stout, not very much longer than second or third segments, which are subequal in length; flagellum two-jointed, and accessory flagellum conical, minute.

Mandible with several tufts of hair posterior to the spine-row; distance from the distal spine of row to cutting edge equal to about one-fourth of total length of mandible.

Third maxilliped resembling first peracopod and of about same length, but with merus, carpus, and propodus stouter; basis a little shorter than rest of limb; carpus as long as ischium and merus together; propodus subequal in length to merus. First peracopods reaching only to level of antennal notch, with joints of approximately same proportions as in third maxilliped. Second peracopods short and stout, with ischium distinct; merus longer than carpus and shorter than dacty-

lus; propodus shorter than carpus. Last three pairs terminating in a claw, and with basis shorter than remaining joints together.

Uropods stout; peduncle nearly as long as fifth pleon somite and one-third as long again as endopod; exopod a little shorter than endopod with two terminal spines, one short and the other rather more than one-third as long as the ramus; endopod single-jointed with inner edge serrate and with terminal spines similar to those of exopod, but with the longer one slightly shorter.

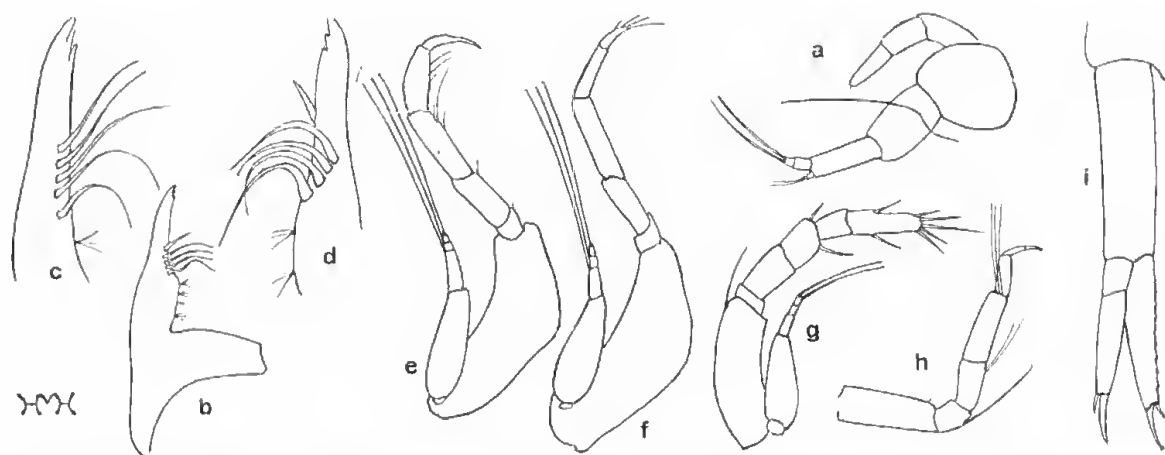


Fig. 8. *Picrocuma paccilola*, paratype ovigerous female; a, first and second antennae ( $\times 200$ ); b, mandible ( $\times 200$ ); c and d, anterior portions of both mandibles ( $\times 450$ ); e, third maxilliped ( $\times 100$ ); f, g, and h, first, second, and fifth pereopods ( $\times 100$ ); i, uropod ( $\times 100$ ).

Colour white, boldly marked with brown.

Length 1.9 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones and in sandy patches (Mar. and Apl., 1936), and Sellick's Beach, burrowing in sand at margin of sea (H. M. Hale, Mar., Apl., and Sept., 1936). Tasmania: Wynyard. Fossil Reef, on stones (N. B. Tindale, Apl., 1936). Type, ovigerous female, in South Australian Museum, Reg. No. C. 2006.

During the periods noted above this was by far the commonest Cumacean at Sellick's Beach; it was abundant on the reef between 0-1 fathoms, and occurred everywhere in the wave-lapped sand of adjacent beaches; although many hundreds of examples were secured, all are immature, although a few subadult females are present. Mr. Tindale, however, took ovigerous females during a brief visit to Tasmania.

Juveniles 1.2-1.4 mm. (fig. 7, c) in length have the form much more slender than in the adult female, and the second to fifth pereon somites not differing markedly in length. The uropods are, as usual, relatively shorter and stouter in the young.

## FAMILY DIASTYLIDAE.

## ANCHICOLURUS Stebbing.

## ANCHICOLURUS WAITEI Hale.

*Anchocolurus waitei* Hale, 1928, p. 45, fig. 15-16.

This species was previously known only from material collected in shallow water in the south-east of South Australia. Both sexes were taken on Sellick's Reef. The carapace is marked with numerous fine ridges, which are not shown in the figure *ut supra*.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936), and Largs Bay (W. H. Baker, Nov., 1889). Tasmania: Wynyard, Rossil Reef, on stones (N. B. Tindale, Apl., 1936).

*Hab.* South Australia and Tasmania.

## GYNODIASTYLIS Calman.

## GYNODIASTYLIS SIMILIS Zimmer.

*Gynodiasylis similis* Zimmer, 1914, p. 189, fig. 15-16.

Zimmer described this species from a single non-ovigerous female, not quite 2 mm. in length. It proves to be rather common on Sellick's Reef, and I have before me adult males and ovigerous females, as well as subadult examples of both sexes.

The male has large exopods on the first four pereopods. Subadult males, 1.6-1.7 mm. in length, have the exopods of the legs well developed, but the flagellum of the second antennae short and unsegmented. These immature males, and all the females, closely resemble Zimmer's specimen, excepting that the carpus and propodus of the first pereopods are relatively wider than as shown by that author; the uropods, excluding the terminal spine of the endopod, are one-third as long again as the sixth pleon somite, the rami are subequal in length with only a few spines, and the endopod is distinctly two-jointed. In fully adult males (1.8-2 mm. in length) the uropods are relatively longer, being one-half as long again as the sixth pleon somite, and have the endopod one-third as long again as the exopod, with no apparent suture dividing it into two joints, and well armed with spines and spinules on the inner margin (see fig. 9 e). On the character of the uropods alone one might regard these males as representatives of a different species, but the other appendages so closely agree with those of females and younger males as to leave no reasonable doubt.

In the adult male the basal joint of the first antennae is barely longer than the second and third together; the flagellum is three-jointed, is about twice as long as the two-jointed accessory lash, and is equal in length to the third peduncular segment. The flagellum of the second antennae is twice as long as the peduncle, and is composed of eleven or twelve joints. The other appendages do not differ appreciably in the adults of both sexes. The mandibles have less than ten spines in the short row, and the basis of the third maxillipeds is not produced apically. In the

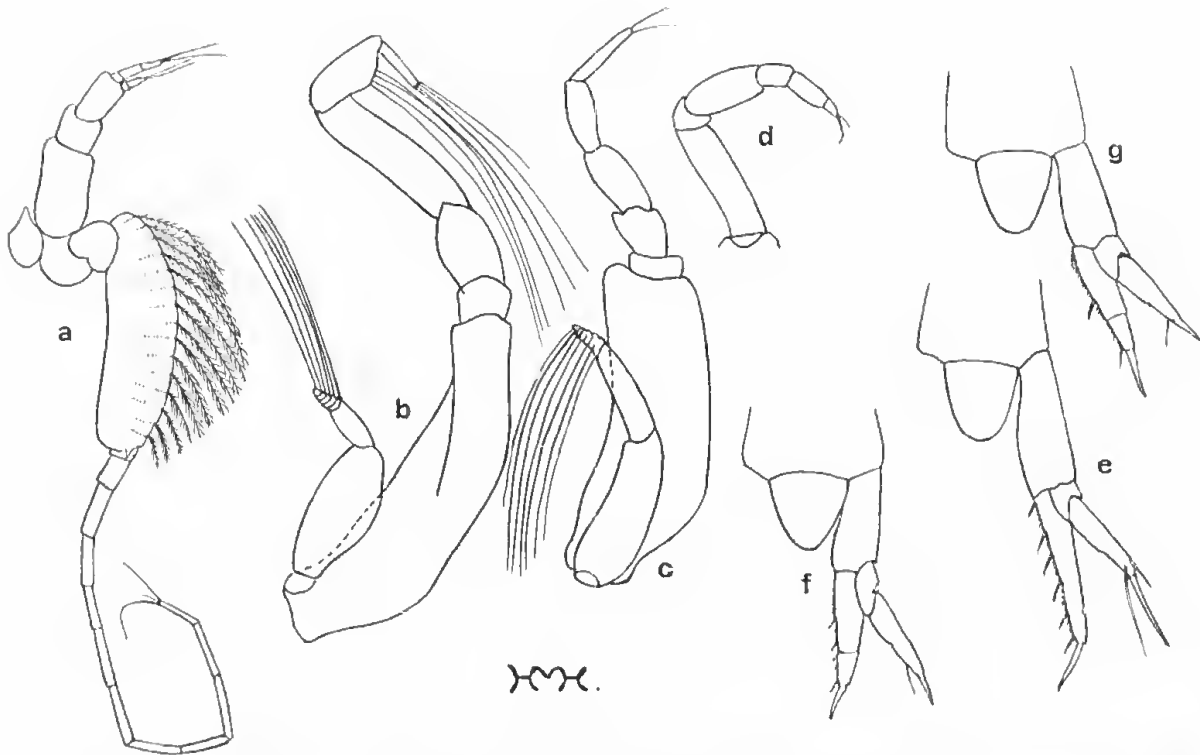


Fig. 9. *Gynodiastylis similis*. Adult male; a, first and second antennae; b, c, and d, first, second, and fifth pereopods; e, telson and uropod. f, Telson and uropod of sub-adult male. g, Telson and uropod of ovigerous female (all  $\times 200$ ).

first pereopods the basis is equal in length to the remaining joints together, and the carpus is only one-fourth as long again as the ischium and merus together. The stout basis of the second pereopods is a little longer than the rest of the limb; the ischium is well developed, and the carpus is a little longer than the propodus, which is subequal in length to the dactylus. The basis of the fifth pereopods is shorter than the rest of the limb.

Ovigerous females are 2-2.15 mm. in length.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936).

*Hab.* Western and South Australia.



## GYNODIASTYLIS TURGIDUS Hale.

*Gynodiastylis turgidus* Hale, 1928, p. 42, fig. 11-12.

Adult male. Integument firm. Carapace barely more than one-third total length, with numerous, fine, lateral ridges; surface between latter reticulate.

First pedigerous somite partly concealed. Third segment of first antennae longer than second, and basal joint longer than either; inner flagellum two-jointed; outer lash four-jointed, and almost as long as third peduncular segment.

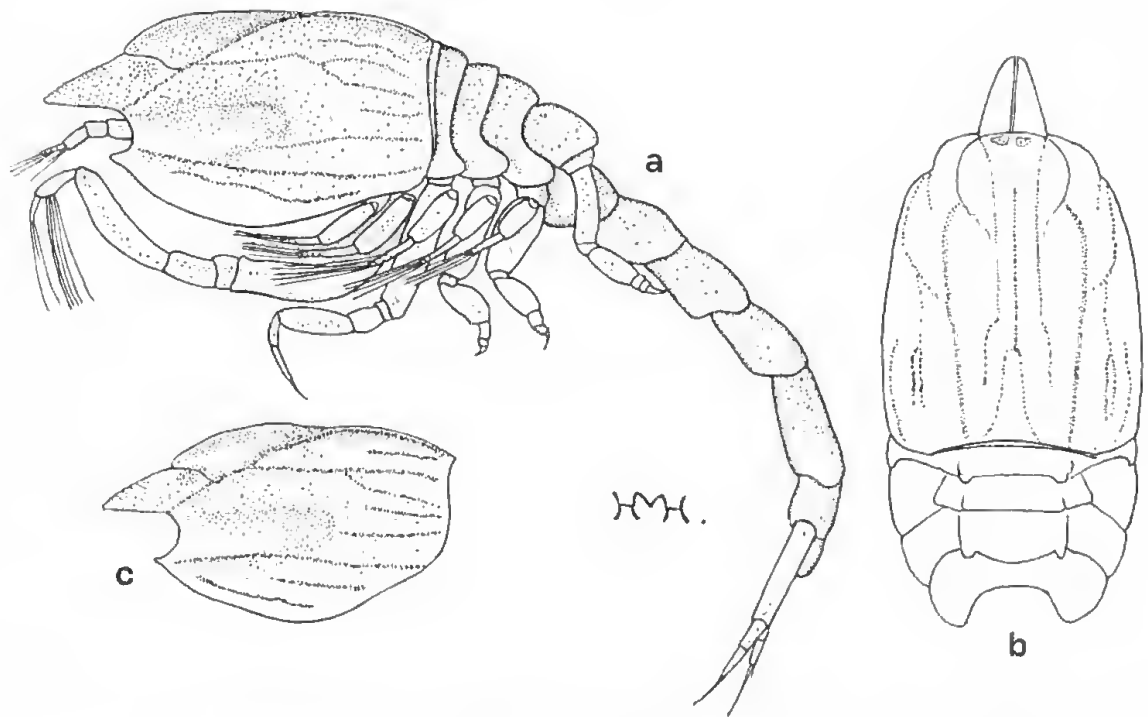


Fig. 10. *Gynodiastylis turgidus*. Adult male; a, lateral view; b, dorsal view of carapace, c, lateral view of carapace of another male ( $\times 50$ ).

Terminal joint of second antennae stout, curved, and with a dense marginal fringe of hairs; flagellum only as long as peduncle, composed of eleven to twelve joints.

Basis of third maxilliped geniculate, one-third as long again as remaining segments together, widened proximally but not produced. First pereopod stout, with carpus reaching to level of apex of pseudorostrum; basis widened at proximal third, bent outwards, and shorter than rest of limb; ischium shorter than merus, the two together less than half as long as the stout carpus, and subequal in length to propodus, which has a dense fringe of long setae on the inner margin of its widened distal portion; dactylus much shorter than propodus, with long

apical setae. There is no marked interval between the second and third legs as in the ovigerous female. Basis of second to fourth legs expanded, in the second and third with a rebate into which the exopod fits. Second peracopod with basis shorter than the rest of the limb, and about two-thirds as wide as long; ischium distinct; merus more than two-thirds as long as carpus, and dactylus slender, without the spine as long as the merus and longer than propodus. Third peracopods with basis almost as wide as long, and longer than rest of limb. Basis of fourth legs about as long as remainder of limb, and also very wide. Fifth legs with basis about equal in length to remaining joints together, and relatively slender.

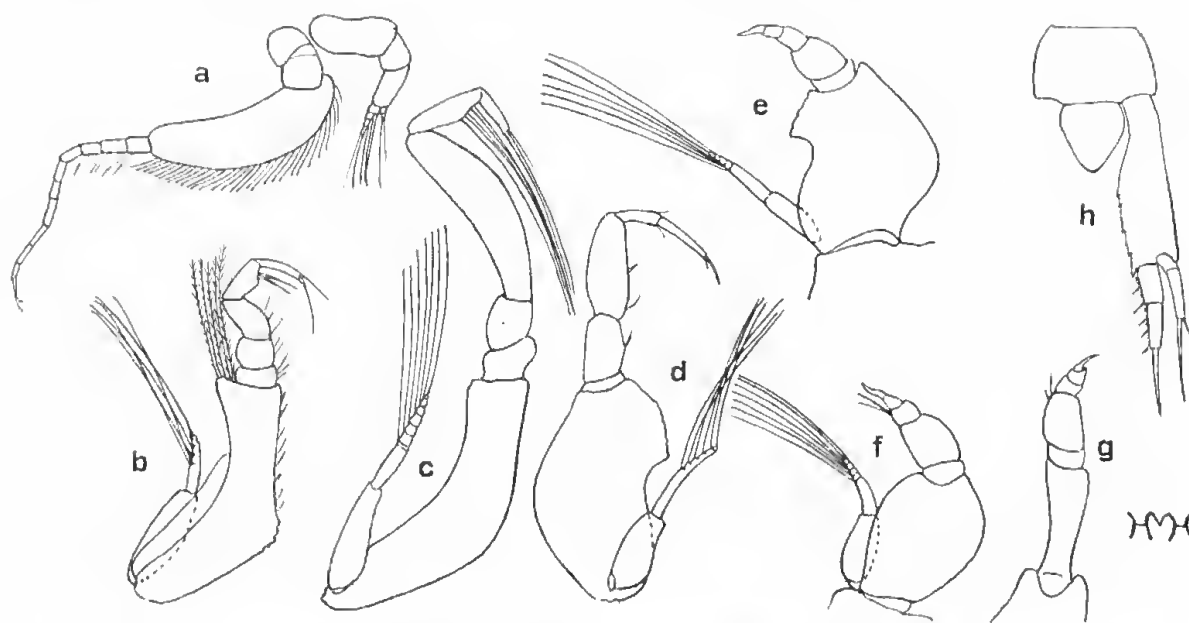


Fig. 11. *Gyrodinastylis turgidus*, adult male: a, first and second antennae; b, third maxilliped; c to g, first to fifth peracopods; h, telson and uropods (all  $\times 60$ ).

Peduncle of uropods stout, nearly three times as long as telson, and as long as fifth pleon somite; exopod three-fifths as long as endopod, with two terminal spines, one longer than the endopod, the other very short; endopod one-half to less than two-thirds as long as peduncle, its segments subequal in length, the first with two spines on inner margin, the second with two on inner margin and two apical spines, one of the latter short and the other as long as endopod.

Colour white.

Length 2.1–2.3 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936); 3 miles off Semaphore, bottom dredge in 5–7 fath. (B. C. Cotton, Nov., 1931).

The species was previously known only from the female. A male was taken by Mr. Cotton, and both sexes were found on stones at Sellick's Reef. The first peracopods of the female have long terminal hairs as in the male.

Smaller males than those described above have the carapace shaped more as in the female (fig. 10, c), although the difference is really very slight.

*Dic Stebbing.*

*DIC LASIODACTYLUM* Zimmer.

*Dic lasiodactylum* Zimmer, 1914, p. 193, fig. 17-18.

A number of females and immature males, 1.75 mm. to 2 mm. in length or a little more, agree with Zimmer's description and figures. The first peracopods are variable in length; in some examples they are as long as the thorax and first five pleon somites together, whereas in others they are shorter, as in the ovigerous female figured by Zimmer.

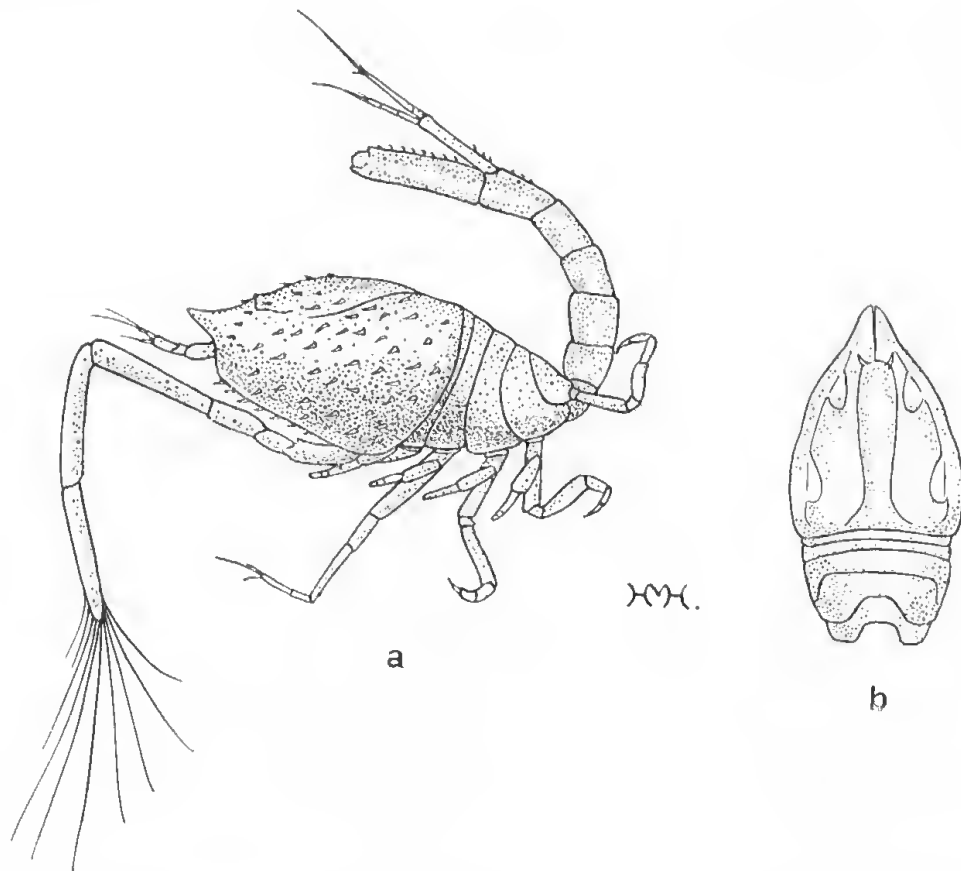


Fig. 12. *Dic lasiodactylum*, male; a, lateral view; b, dorsal view of cephalothorax ( $\times 30$ ).

A male, 3 mm. in length, taken in company with these smaller examples, is so different that one was at first inclined to regard it as representing a different species. It is not fully mature; the second antennae reach only a little beyond the posterior margin of the carapace, and have the flagellum stout and composed of only a few joints, while the exopods of the thoracic appendages have no long hairs.

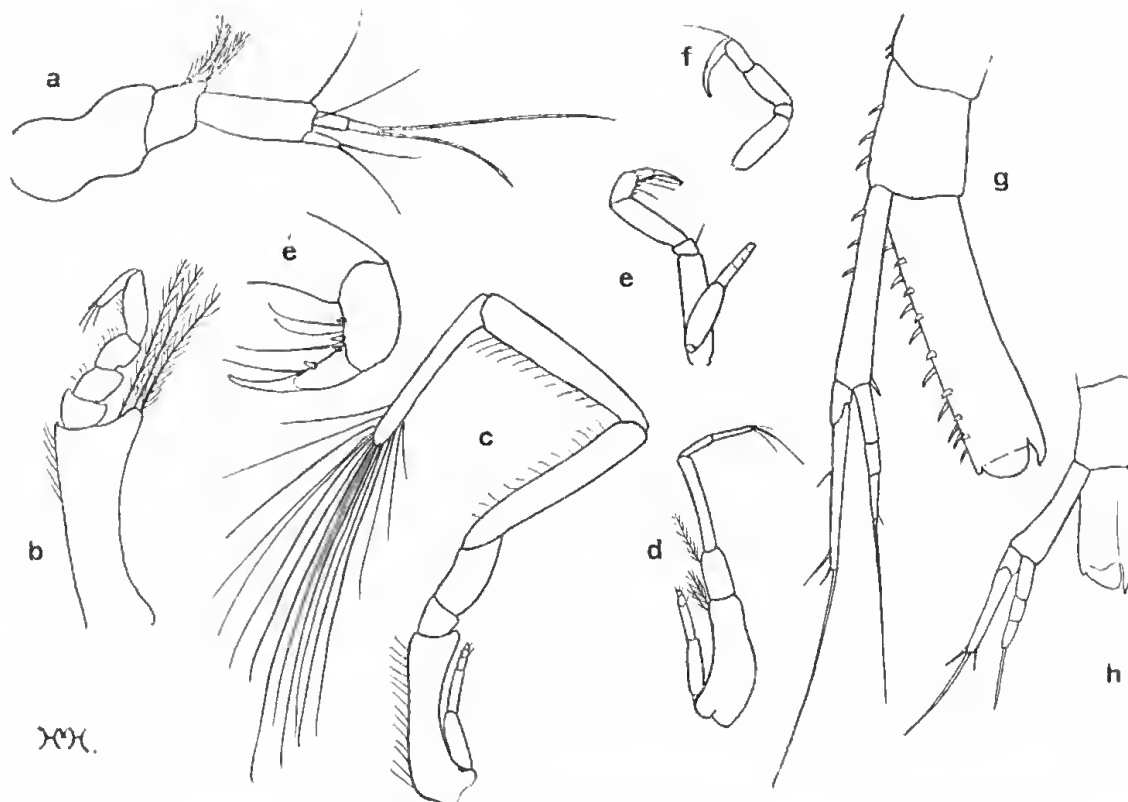


Fig. 13. *Diclasiodactylum*. Male 3 mm. in length; a, first antenna ( $\times 115$ ); b, third maxilliped ( $\times 57$ ); c to f, first, second, third, and fifth peracopods ( $\times 41$ ); e', terminal part of third peracopod ( $\times 115$ ); g, telsonic somite and uropod ( $\times 57$ ). h, Telsonic somite and uropod of male 1.75 mm. in length ( $\times 57$ ).

The carapace is covered with very small spines interspersed with which are some larger spines; there is a shallow, median, dorsal trough. The first antennae have the second peduncular joint only half as long as the third; the two-jointed flagellum terminates in two long jointed filaments. The mandibles have seven and eight spines in the spine-row; the anterior part is slender, with the cutting edge narrow. The first peracopods have the basis only about one-fourth as long as the rest of the limb, the carpus and the propodus of about the same length, and the dactylus a little shorter. The second peracopods have the ischium suppressed and the carpus elongate, longer than propodus and dactylus together. The last three pairs of

legs have the dactylus claw-like, and the terminal joints are armed with a few short, stout spines.

This large male differs most strikingly from smaller males and females, however, in the proportions of the telson and uropods. As in the other described species of the genus (*D. calmani* Stebbing and *D. tubulicauda* Calman—see Stebbing, 1913, pp. 160-161) the telson is much longer than the sixth pleon somite, and than the peduncle of the uropods. The three-jointed endopod of the uropods is about four-fifths as long as the exopod, and its long terminal spine is considerably longer than the ramus; the exopod is shorter than the peduncle, and its spine is longer than the latter; the peduncle is furnished with a few spines, and is less than three-fourths as long as the telson, which is armed inferiorly with large spines.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936). Tasmania: Wynyard, Fossil Reef, on stones (N. B. Tindale, Apl., 1936).

*Hab.* South-western and southern Australia.

PACHYSTYLIS Hansen.

PACHYSTYLIS VIETUS sp. nov.

Ovigerous female. Integument moderately indurated. Carapace half as wide again as deep, and one and two-third times as long as pedigerous somites together; dorsum with a pair of fold-like, convergent ridges meeting behind the ocular lobe; each side with a similar outstanding carina; surface covered with closely-set spin-

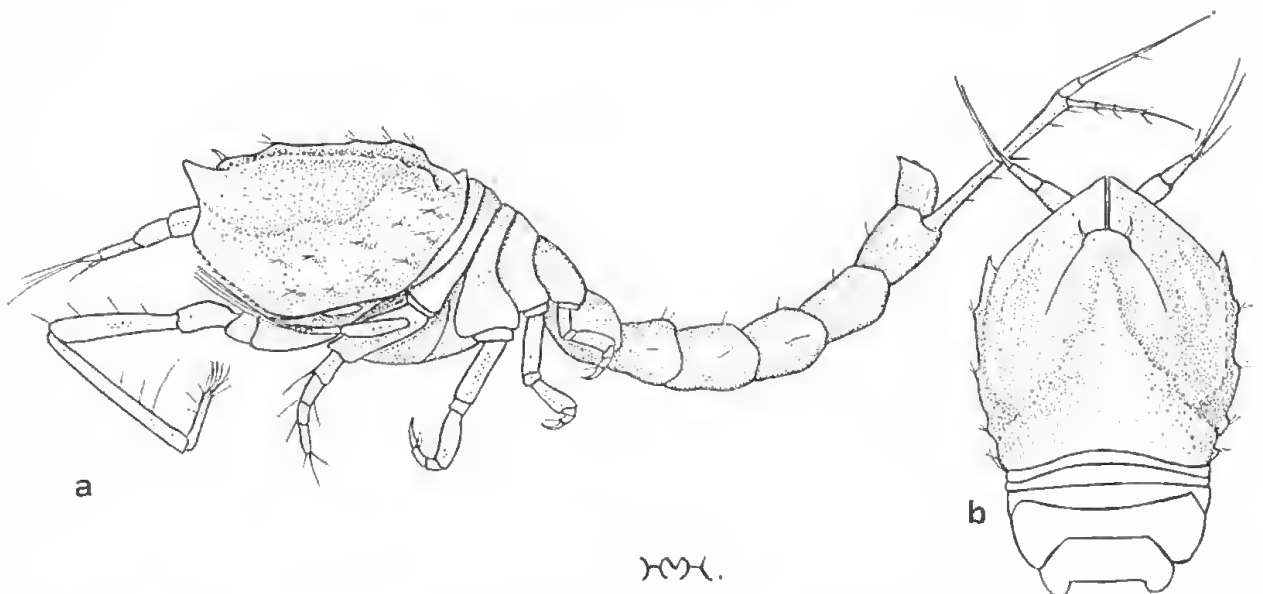


Fig. 14. *Pachystylis vietus*, type female; a, lateral view; b, dorsal view of cephalothorax ( $\times 33$ ).

ules, and with sparse hairs set on small elevations. Pseudorostral lobes broad, pointed anteriorly, and meeting for almost one-fifth of total length of carapace. Ocular lobe wide, rounded and armed with a pair of spines; eye not discernible. Antennal notch not well marked, and antennal angle rounded.

First pedigerous somite exposed, short; second and third somites equal in length to first dorsally, but with pleural parts expanded, the inferior margin of the third being longer than in any of the others; dorsal length of fifth somite greater than that of fourth, and equal to that of second and third somites together.

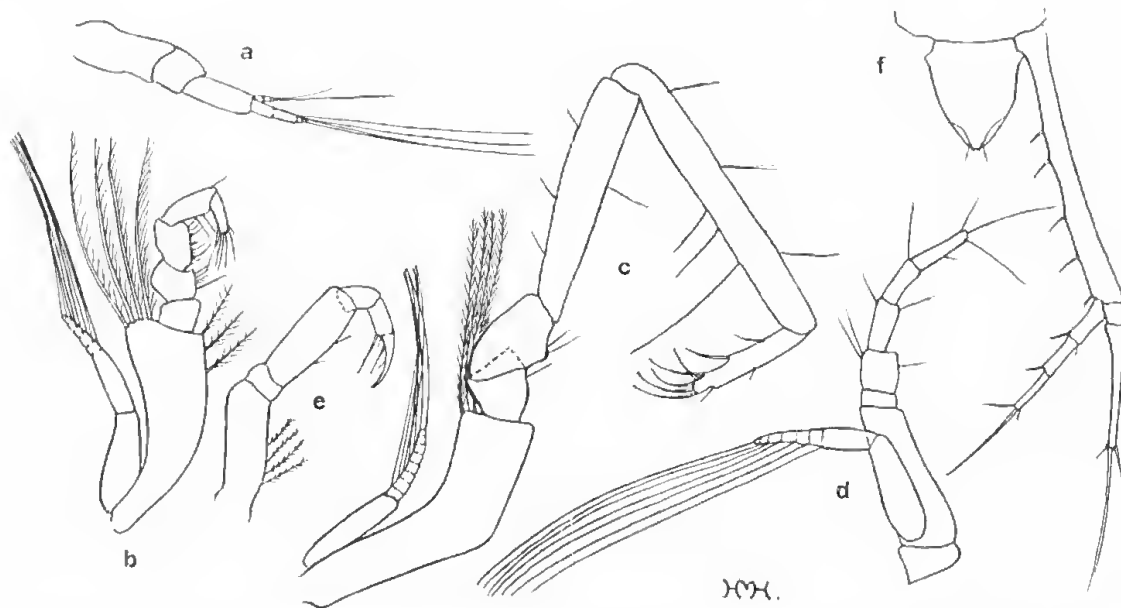


Fig. 15. *Pachystylis victus*, type female; a, first antenna; b, third maxilliped; c, d, and e, first, second, and third peracopods; f, telson and uropod (all  $\times 62$ ).

First to sixth pleon somites not markedly differing in length; telson not much more than half as long as preceding somite, with a pair of exceedingly short, blunt, apical spines, and a pair of setules.

First antennae with first joint of peduncle five-sixths as long as second and third together; third much longer than second; flagellum four-jointed, as long as third peduncular joint; accessory flagellum three-jointed. Mandibles with ten spines in the spine-row.

Third maxilliped with basis curved, considerably widened distally but not produced, and equal in length to remainder of appendage; carpus longer than ischium or merus, slightly shorter than propodus, and about as long as dactylus. First peracopods long, more than two-thirds as long as the whole animal, and with the merus reaching to level of pseudorostral lobes; basis strongly geniculate, a

little widened distally but not produced, and not much more than one-third as long as the rest of the limb; carpus shorter, and propodus longer, than basis; dactylus one-half as long as carpus, and equal in length to ischium and merus together. Second peracopods with basis more than three-fourths as long as remainder of limb; ischium distinct, this joint and the merus wider than the three terminal joints, which do not differ much in length. Basis in three posterior legs about as long as ischium and merus together.

Peduncle of uropods slender, as long as the telson and two preceding pleon somites together, and twice as long as rami; with five spines on inner margin; endopod with the three joints subequal in length, each with a subapical spine on inner edge; apical spine of endopod about as long as the two terminal joints; exopod barely longer than endopod, with the apical spine as long as the ramus.

Colour white.

Length 2.4 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Mar., 1936). Type in South Australian Museum, Reg. No. C. 2017.

The genus was previously known from a single species.

#### ALLODIASTYLIS gen. nov.

Like *Gynodistylis* Calman (1911, p. 367), but differs in having the first antennae relatively much more developed in both sexes, and with the accessory flagellum relatively large. Further, the telson is larger, with a pair of well-developed apical spines in the male, and the third legs are not widely separated from the second in the adult female.

The male has no pleopods, and has well-developed exopods on the third maxillipeds and on the first four pairs of peracopods. The endopod of the uropoda is two-jointed, and the telson has no lateral spines. As in some species of *Gynodistylis* the ischium of the second legs is obsolete, and the telson of the female has a pair of rudimentary apical spines. I can find no exopods on any of the peracopods of the female, or on the third maxillipeds, but it is only fair to add that the single specimen is in a dirty condition.

Genotype: *A. cretatus* sp. nov.

#### ALLODIASTYLIS CRETATUS sp. nov.

Ovigerous female. Integument indurated, chalky white. Carapace not much more than one-third total length, its depth equal to greatest breadth, which is one-half its length; dorsal margin sinuate, serrate, and inferior margin serrate; each side with a dorso-lateral ridge. Pseudorostral lobes meeting in front of ocular lobe

for a distance equal to nearly one-third of length of carapace. Ocular lobe wide with colourless lenses.

All five pedigerous somites exposed, together more than one-half as long as carapace; the first short and second and third with pleural parts expanded.

First six pleon segments more or less equal in length; telson longer, terminating in a pair of inconspicuous spines.

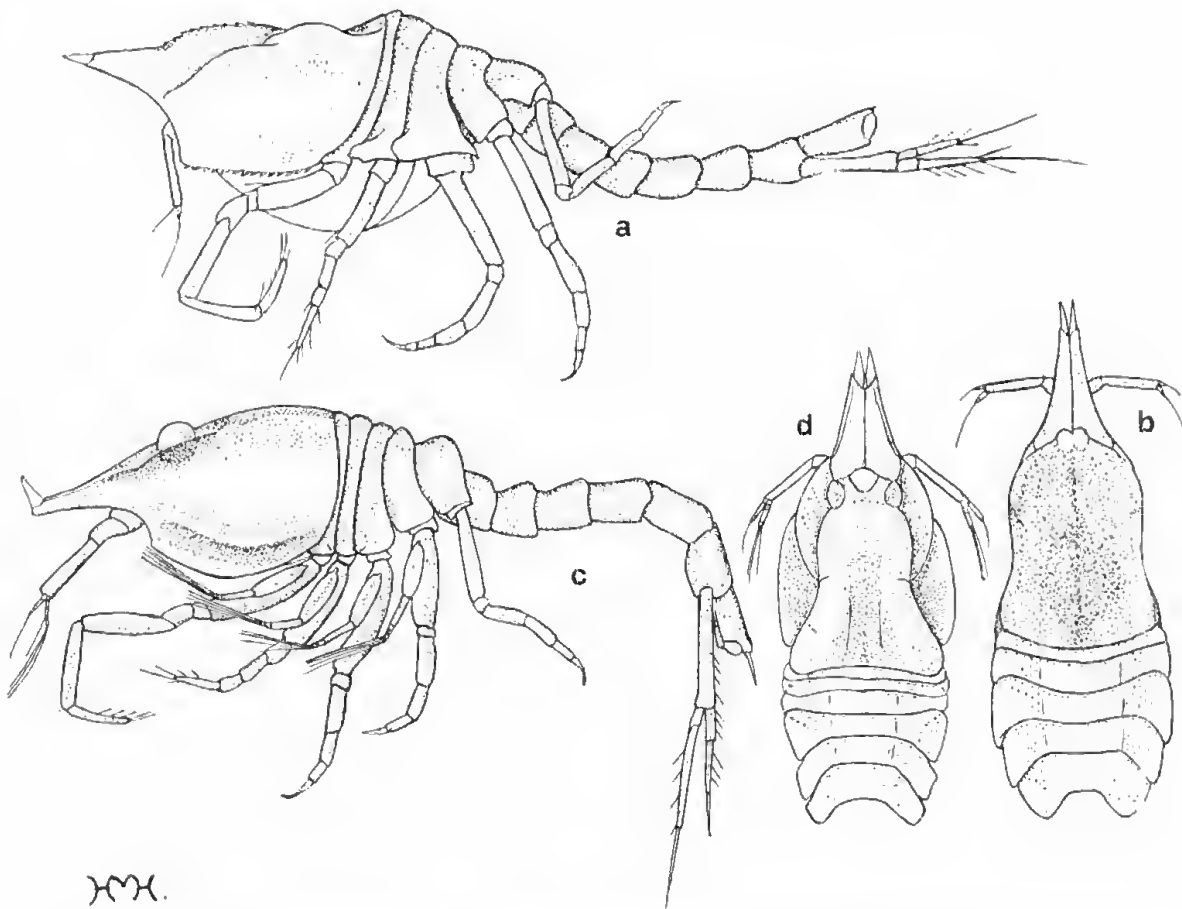


Fig. 16. *Allodiastylis eretulus*. Type female; a, lateral view; b, dorsal view of cephalothorax ( $\times 28$ ). Allotype male; c, lateral view; d, dorsal view of cephalothorax ( $\times 34$ ).

First antennae with the first joint robust, longer than the second, geniculate, and armed with a pair of short, stout spines; third joint longer than first and second segments together; flagellum four-jointed, more than one-third as long as last joint of peduncle, and twice as long as accessory flagellum, which is apparently only one-jointed. Mandible with eleven spines.

Third maxillipeds stout; basis shorter than palp, apically considerably expanded (but not forwardly produced), and furnished with long plumose setae;



merus, carpus, and propodus of approximately equal length, dactylus a little shorter. Coxae of peraeopods large. First peraeopod on left side reaching beyond apex of pseudorostrum, with basis only one-third as long as remainder of

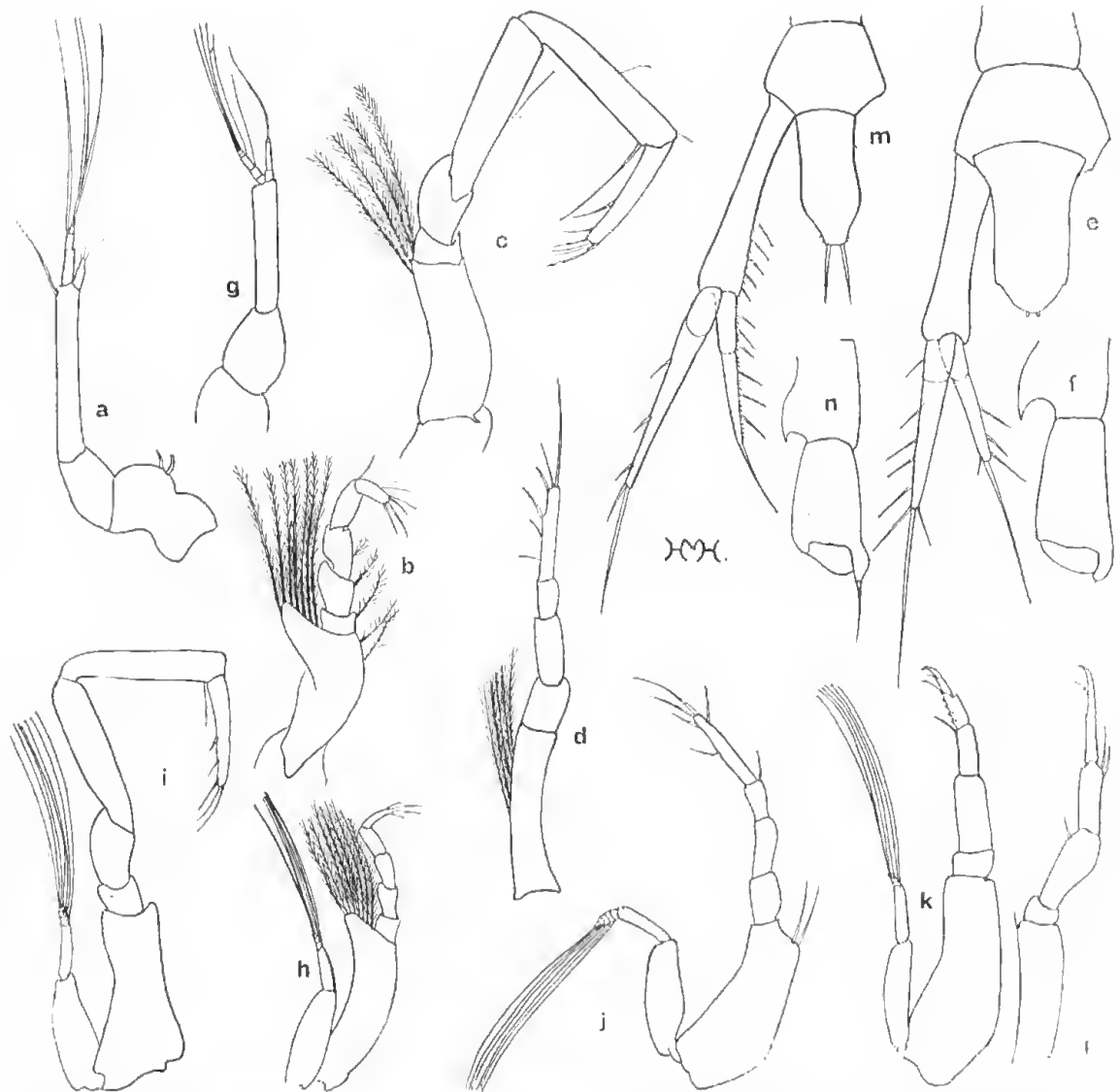


Fig. 17. *Allodiastylis erectulus*. Type female; a, first antenna; b, third maxilliped; c, first peraeopod of left side; d, second peraeopod (all  $\times 62$ ); e, dorsal view of telson and uropod ( $\times 45$ ); f, lateral view of telson. Allotype male; g, first antenna; h, third maxilliped; i to l, first, second, third, and fifth peraeopods (all  $\times 62$ ); m, dorsal view of telson and uropod ( $\times 45$ ); n, lateral view of telson ( $\times 45$ ).

limb; carpus and propodus subequal in length, each more than half as long again as dactylus. First peraeopod of right side apparently regenerated, with the three terminal segments considerably shorter. Second peraeopod with basis narrow.

two-thirds as long as rest of limb; dactylus more than twice as long as propodus. Third to fifth legs with merus longer than any of other joints apart from basis. Fifth legs more slender, but not shorter, than others.

Peduncle of uropods slightly longer than telson; exopod subequal in length to peduncle, with a terminal spine as long as ramus, and with several slender spines on outer margin; endopod about two-thirds as long as exopod, with the first joint approximately two-thirds as long as second, with a terminal spine as long as the ramus, and with several spines on inner margin.

Length 3 mm.

Male. Differs from the female as follows. Integument translucent, brittle. Dorso-lateral and infero-lateral areas of the carapace each with an elevated ridge. Eyes larger. Telson less stout, and with a pair of apical spines, each of which is half its length. First antennae stouter, with the accessory flagellum three-jointed and as long as the five-jointed flagellum. Third maxillipeds narrower, with exopod as long as basis. Basis of first to fourth pereopods wider, but proportions of joints as in female. Uropods with a few spines on inner margin of peduncle, and with more numerous spines on inner margin of endopod.

Length 2.4 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936). Types in South Australian Museum, Reg. No. C, 2019, 2020.

An adult male and female, and a juvenile 1.2 mm. in length, were taken; in the last-named the eye is pigmented.

## FAMILY NANNASTACIDAE

### SCHIZOTREMA Calman.

#### SCHIZOTREMA BIFRONS Calman.

*Schizotrema bifrons* Calman 1911, p. 362, pl. xxxiv, fig. 18-21.

The carapace bears scattered tubercles and small spines, or small spines only. The second and third joints of the peduncle of the first antennae are subequal in length, each less than half as long as the geniculate first joint; the flagellum is two-jointed. The third maxillipeds have the basis very wide and produced apically, while the merus also is considerably expanded and produced; there is a long apical spine (as well as plumose hairs) on the merus and carpus. The basis of the first pereopods is less than half as long as the remaining joints together, and is armed with a row of moderately large spines in addition to small spines; the carpus is

slightly shorter than the propodus. The second peracopods have the basis wide, not much shorter than rest of limb, and armed with a row of very large spines; the carpus is more than twice as long as the propodus, and subequal in length to the dactylus.

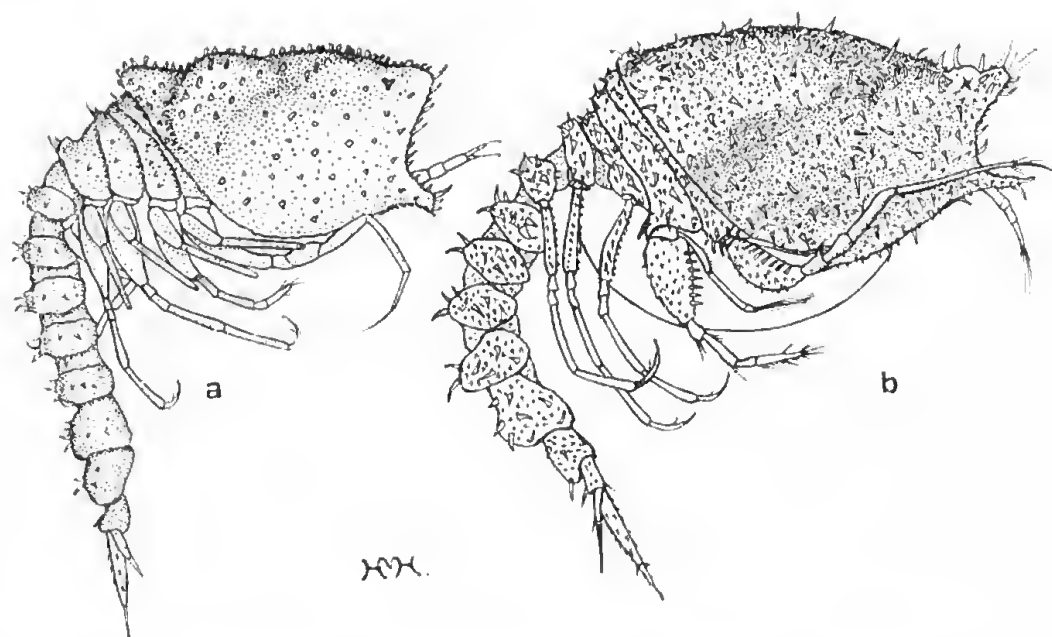


Fig. 18. *Schizotrema bifrons*; lateral views of (a) male and (b) female ( $\times 60$ ).

The male differs from the female in having the carapace not so deep, the accessory flagellum of the first antennae larger, and the third and fourth peracopods with widened basis. There are well developed exopods on the first to fourth legs.

The branchial regions of the carapace are swollen in both sexes, but the tumidities are much more developed in some specimens than in others.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Jan., Mar., and Apl., 1936).

*Hab.* India and Southern Australia.

*SCHIZOTREMA BIFRONS* Calman var. *ACULEATA* var. nov.

Some examples of both sexes, both juvenile and adult, differ consistently in having the spiny armature much more developed, and for these the varietal name *aculeata* is proposed.

The accompanying figures of the appendages of the variety would illustrate equally well those of short-spined typical specimens.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Mar. and Apl., 1936). Type in South Australian Museum, Reg. No. C. 2048.

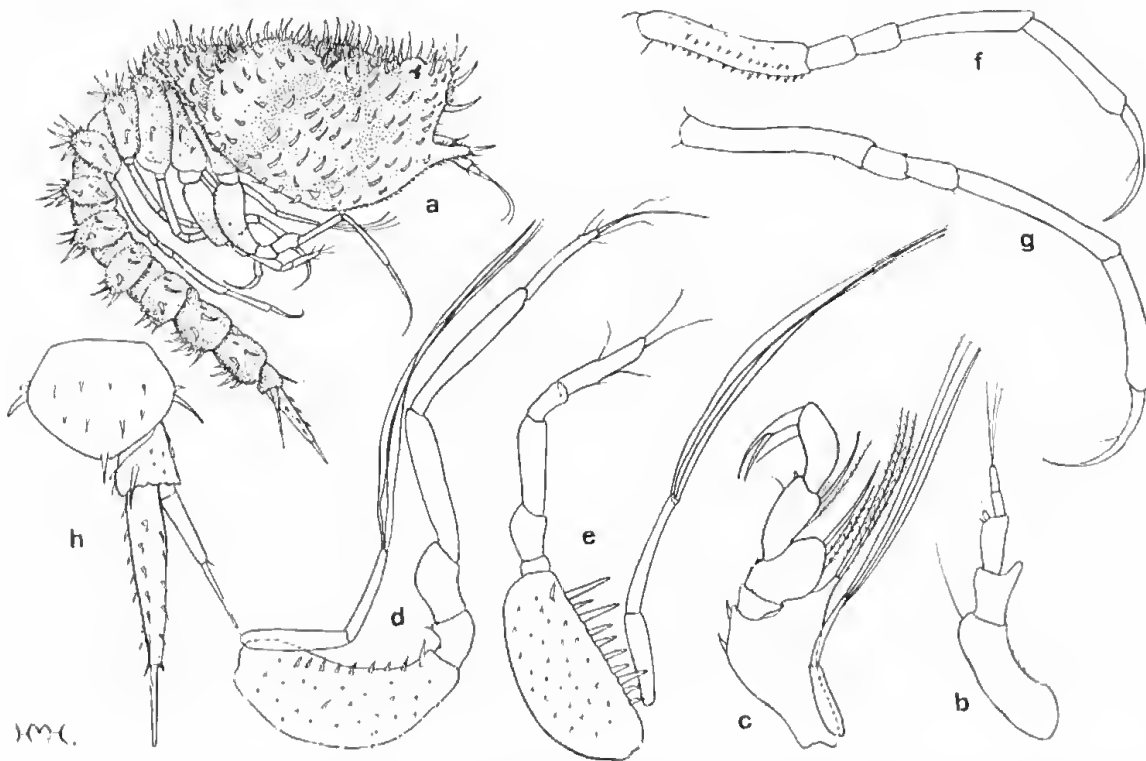


Fig. 19. *Schizotreme bifrons* var. *aculeata*, type female: a, lateral view ( $\times 43$ ); b, first antenna; c, third maxilliped; d to g, first, second, third, and fifth peracopods; h, telson and uropod (all  $\times 120$ ).

#### NANNASTACUS Spence Bate.

##### NANNASTACUS HANSENI Calman.

*Nannastacus hanse* Calman, 1905, p. 11, fig. 1, a-e; Stebbing, 1913, p. 172.

Two males were found burrowing in a layer of sand on a stone. In one of these the spiny armature is more strongly developed than in the specimen figured by Calman; the "low rounded tubercles" of the carapace are higher, and many of them have become short spines, which are particularly prominent at the posterior portion of the carapace. The subcylindrical dorsal processes of the pleon are distinctly stouter, and have the apical spines longer, while several of the subapical tubercles are developed as strong spines.

In both specimens now examined the antero-lateral angle of the carapace bears a short spine.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stone, 1 fath. (H. M. Hale, Mar., 1936).

*Hab.* Sunda Sea and South Australia.

NANNASTACUS GIBBOSUS Calman.

*Nannastacus gibbosus* Calman, 1911, p. 355, pl. xxxiii, fig. 16-21; Stebbing, 1913, p. 170.

This species is not uncommon on Sellick's Reef. As noted by Calman, it varies considerably in the degree of inflation of the branchial regions and in the size of the hinder dorsal tumidity of the carapace. In one female the carapace is so swollen that its greatest width is equal to four-fifths its length, while the pleural parts of the pedigerous somites are very swollen and prominent. In some examples a hairy covering is well developed; in others it is sparse or almost entirely absent. In the male the peraeopods are much as in the female, but the basis is expanded in the third and fourth pairs, being twice as long as wide in the third legs and one and one-half times as long as wide in the fourth. The uropods do not differ from those of the female.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Jan. and Apl., 1936).

*Hab.* Gulf of Siam and South Australia.

NANNASTACUS ZIMMERI Calman.

*Nannastacus zimmeri* Calman, 1911, p. 352, pl. xxxiii, fig. 4-15; Stebbing, 1913, p. 169.

This species was taken in company with *N. gibbosus*.

Males approximately 1.6 mm. in length are as described and figured by Calman, but larger males (2.2 mm.) have the branchial regions more inflated, and there is a posterior dorsal tumidity on the carapace.

Foxon (1932, p. 392) records the related *N. submii* Sars from Queensland.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Apl., 1936).

*Hab.* Ceylon and South Australia.

CUMELLA G. O. Sars.

CUMELLA LAEVE Calman.

*Cumella laevis* Calman, 1911, p. 350, pl. xxxii, fig. 25-27, Stebbing, 1913, p. 182.

Ovigerous female. Carapace and pleon finely granulose. Carapace one-third the total length, its depth more than half its length; subtriangular in shape in

lateral view, and with a faint, median, dorsal carina; dorsal margin straight, slightly sinuous. Pseudorostral lobes short and truncate, meeting in front of eye-lobe for a distance equal to the width of the last-named. Antero-lateral margins almost straight, antennal notch wide and shallow, and antennal angle rounded; inferior margin serrate, with a small tooth at anterior angle.

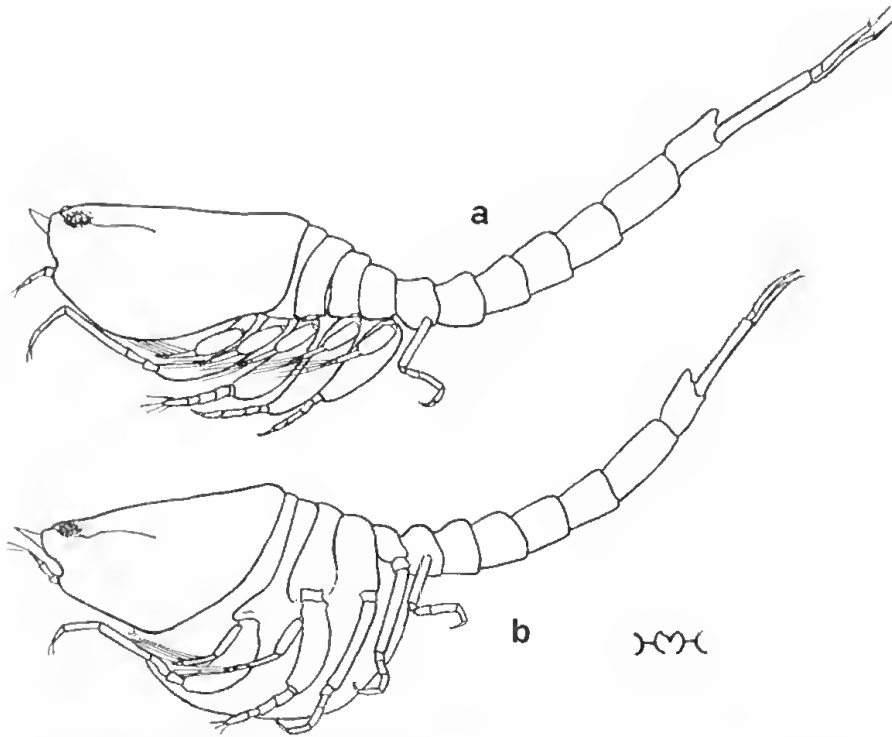


Fig 20. *Cumella laevis*; lateral views of (a) male and (b) ovigerous female ( $\times 50$ ).

Pedigerous somites all exposed, together two-thirds as long as the carapace.

Pleon shorter than cephalothorax, and with the first three somites slightly elevated dorsally; telsonic somite about two-thirds as long as preceding somite, projecting slightly posteriorly.

Eye pigmented. First antennae with peduncle stout, slightly geniculate, more than one and two-thirds times as long as second joint, which is subequal in length to the third, and rather more than twice as long as wide; flagellum somewhat longer than last peduncular joint, composed of two subequal segments; accessory flagellum rudimentary, single-jointed.

Third maxilliped with basis as long as palp exclusive of dactylus; ischium very short; merus strongly produced at outer apical angle, and about as long as propodus, which is one-third as long again as carpus. First pereopod with basis curved, almost two-thirds as long as remaining joints together; carpus slightly

longer than ischium and merus together; propodus five-sevenths as long as carpus, and nearly twice as long as dactylus. Second peraeopods with basis four-fifths as long as rest of limb, and with a small stout spine near base; ischium distinct; merus and carpus subequal in length, each three-fourths as long as dactylus, the long terminal spine of which is longer than the joint; propodus barely more than half as long as carpus. Last three pairs of legs rather slender. Basis of third pair three-fourths as long as rest of limb. Fifth with basis half as long as remaining joints together; carpus half as long again as merus.

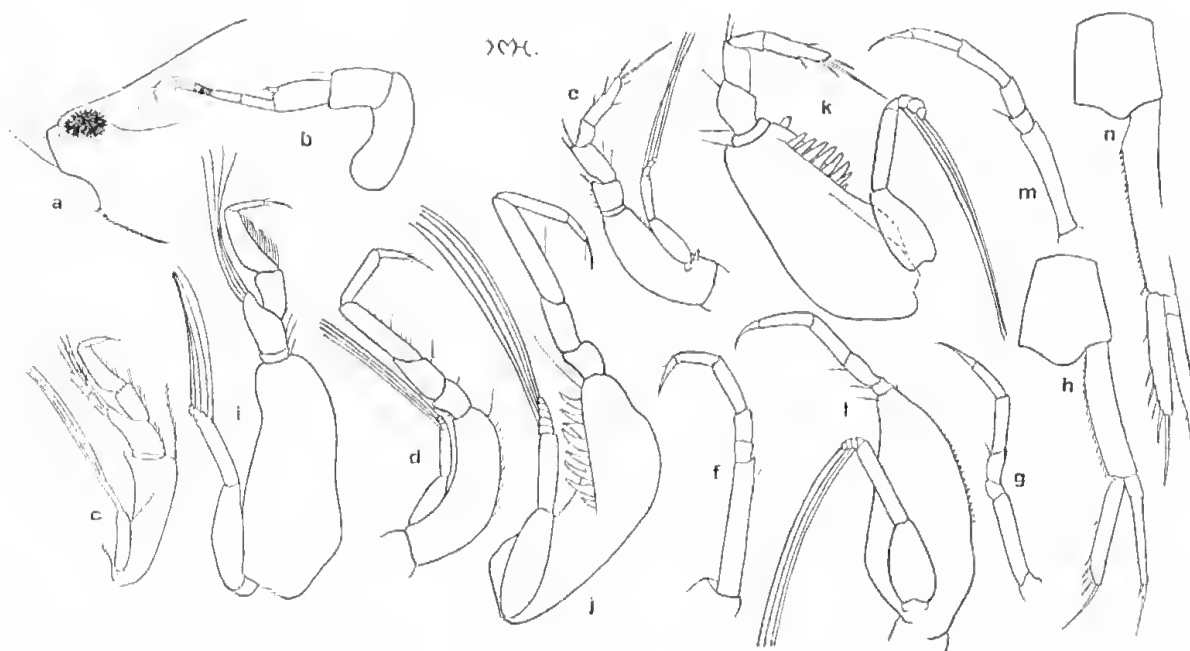


Fig. 21. *Camella laevis*. Ovigerous female; a, lateral view of anterior portion of carapace ( $\times 92$ ); b, first antenna ( $\times 150$ ); c, third maxilliped; d to g, first, second, third, and fifth peraeopods; h, telson and uropod. Adult male; i, third maxilliped; j to m, first, second, third, and fifth peraeopods; n, telson and uropod (all  $\times 92$ ).

Uropods rather stout; peduncle half as long again as telsonic somite, serrate on inner edge; endopod almost as long as exopod, three-fourths as long as peduncle, with the long terminal spine half the length of the ramus, and with four subapical spines on inner margin; exopod serrate on inner margin, with apical spine about half as long as ramus.

Colour smoky grey.

Length 1.5 mm.

Adult male. The carapace is subrectangular rather than triangular in lateral view. The third maxillipeds and first to fourth peraeopods have the basis much more massive than in the female. In the third maxillipeds it is two and one-third

times as long as wide, and considerably longer than the palp. In the first peraeopods it is almost as long as the remaining joints together, and bears a row of large stout spines on the distal half. The second legs have a row of similar spines on the basis, which is nearly half as wide as long. Basis of third and fourth peraeopods about two and one-half times as long as wide, serrate on outer edge, and much longer than rest of limb. Fifth pair much as in female.

Uropods relatively longer than in female; peduncle more than two-thirds as long again as telsonic somite, and more than half as long again as endopod; terminal spines more than half length of respective rami.

Length 1.6 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Mar. and Apl., 1936).

*Hab.* Gulf of Siam and South Australia.

Young males resemble females in the shape of the carapace. In juveniles of both sexes the uropods have the peduncle relatively shorter, and in non-ovigerous females 1.2–1.5 mm. in length it is barely longer than the telsonic somite.

The ovigerous female described above is so exceedingly close to Calman's description of *C. laeve* that I hesitate to describe it as new. Calman's adult female differs from the specimens now examined in the following particulars:

The size is smaller (two-thirds as long as South Australian examples); the last segment of the peduncle of the first antennae is described as shorter than the preceding joint, and the basis is relatively shorter in the first and second peraeopods. The peduncle of the uropods is stated to be nearly twice as long as the telsonic somite, whereas in none of the adult females before me is it more than half as long again as this somite. Because of these differences, and because the male of *C. laeve* is unknown, the South Australian material is described and figured in some detail.

#### CUMELLA LIMA sp. nov.

Ovigerous female. Carapace and pleon granulose. Carapace almost one-third total length, its depth half the length, and less than greatest width; there is a large tumidity on each side, followed by a smaller swollen area, so that a lateral view of the carapace shows a depression near the hinder margin, while in dorsal view the back is fiddle-shaped; at about the first third of the length is a pair of small dorsal elevations. Pseudorostrum long, directed slightly upwards. Antero-lateral margin concave, and antennal angle quadrate. Ocular lobe wide.

Pedigerous somites all exposed, the third to fifth with dorsal tumidities.

Pleon not much shorter than cephalothorax, with the first four somites tumid dorsally; telsonic somite three-fourths as long as fifth, broadly rounded, and only slightly produced posteriorly.



Eyes black. First antennae with peduncle stout, the second joint produced distally, and the third only two and one-third times as long as wide; flagellum short, little more than half as long as third peduncular segment, two-jointed; accessory flagellum small, unjointed.

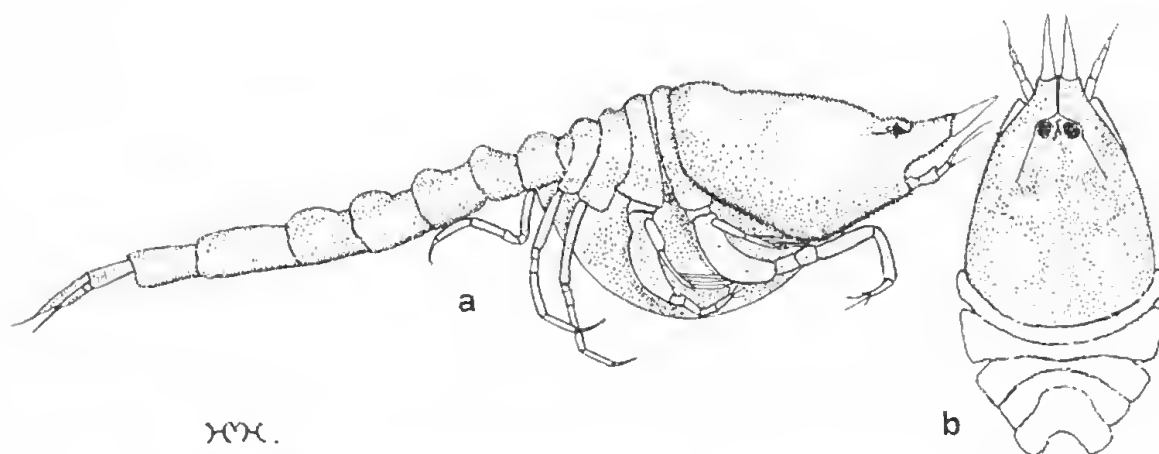


Fig. 22. *Cunella lima*, type female; a, lateral view; b, dorsal view of cephalothorax ( $\times 53$ ).

First peracopods with basis not much more than half as long as rest of limb, and with merus one-half as long as carpus. Second peracopods with the stout basis rather more than two-thirds as long as remaining segments; ischium not distinct. Third to fifth slender; basis of third equal in length to rest of limb, that of fourth and fifth shorter; fifth leg with carpus twice as long as merus, and barely four-fifths as long as basis.

Uropods stout, the peduncle three-fourths as long as the telsonic somite, and with six thorn-like projections on inner margin; endopod longer than the peduncle, terminating in a distinctly marked off, finely serrate spine, which is more than half the length of the ramus itself, and with a subapical serrulate spine about one-third as long as the terminal spine; inner margin of endopod with six to seven thorn-like spines; exopod two-thirds as long as endopod, with a slender terminal spine as long as ramus.

Colour cream.

Length 1.5 mm.

Male. The basis of the third and fourth peracopods is greatly expanded, the breadth being equal to half the length. The carpus of the fifth leg is nearly three times as long as the merus, and not much shorter than the basis. The peduncle of the uropods is longer, being slightly greater in length than the telsonic somite; the endopod is a little shorter than the peduncle.

Length 1.6 mm.

*Loc.* South Australia: Gulf St. Vincent, Sellick's Reef, on stones, 1 fath. (H. M. Hale, Mar., 1936). Tasmania: Wynyard, Fossil Reef (N. B. Tindale, Apl., 1936). Types in South Australian Museum, Reg. No. C. 2037, 2038.

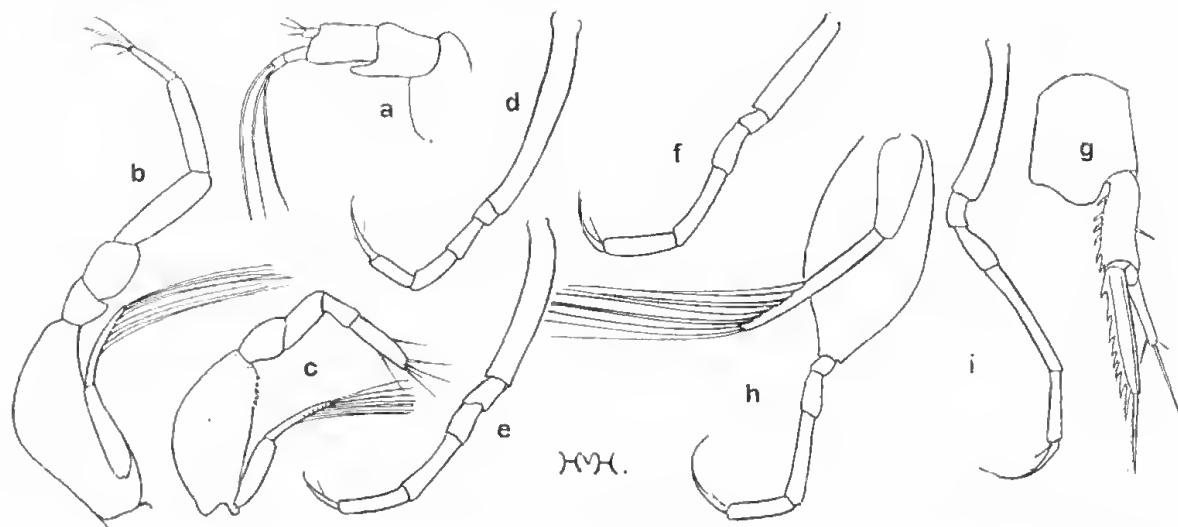


Fig. 23. *Cumella lima*. Paratype female; a, antenna ( $\times 190$ ); b to f, first to fifth pereopods; g, telson and uropod. Paratype male; h and i, fourth and fifth pereopods (all  $\times 120$ ).

This species is represented by a number of examples which resemble *C. hispida* (Calman, 1911, p. 347, pl. xxxii, fig. 15-18), but differs consistently from Calman's description in the following particulars. The size is smaller, ovigerous females being 1.4 mm. to 1.5 mm. in length (2.55 mm. Calman), while the first antennae are stouter, the third joint being twice to two and one-third times as long as wide (three times Calman). Zimmer (1914, p. 179) comments on the fact that the first antennae are stouter in the Western Australian specimens which he names as *C. hispida*. The uropoda, too, are different, for in *C. hispida* the terminal spine is indistinctly marked off from the endopod, and this ramus, together with its long spine, "measures a little more than the length of the peduncle"; in *C. lima* the endopod with its spine is one and two-thirds to twice as long as the peduncle. The armature of the uropods is not as described for *C. hispida*, and the proportions of the leg segments are different.

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